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LERNER AND GREENBERG, P.A.

PATENT ATTORNEYS AND ATTORNEYS AT LAW

2445 Hollywood Boulevard
Hollywood, Florida 33020
Tel: (954) 925-1100
Fax: (954) 925-1101

PATENTUSA SM
www.patentusa.com
patents@patentusa.com

Mailing Address:
Post Office Box 2480
Hollywood, FL 33022-2480

Herbert L. Lerner (NY Bar)
Laurence A. Greenberg (FL Bar)

Werner H. Stemer (FL Bar), Senior Attorney

Ralph E. Locher (FL, IL, MO Bars)
Manfred Beck (US & German Pat. Agent)
Mark P. Weichselbaum (TN Bar)
Gregory L. Mayback (FL Bar)
Markus Nolff (FL Bar)
Otto S. Kauder (Reg. Pat. Agent)
Loren Donald Pearson (FL Bar)

New York Office
153 E 57th Street
Suite 15G
New York, NY 10022

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I hereby certify that this paper or fee is being deposited with the United States Postal Service "Express Mail Post Office to Addressee" service under 37 CFR 1.10 on the date indicated above and is addressed to the Assistant Commissioner for Patents, Washington, D.C. 20231.

Docket No.: 2641/207-168

Date: September 20, 2000

Michael J. Burns
MICHAEL BURNS

Hon. Commissioner of Patents and Trademarks
Washington, D.C. 20231

Sir:

Enclosed herewith are the necessary papers for filing the following application for Letters Patent:

Applicant : FRIEDHELM BECKMANN

Title : HOLLOW SECTION WITH INTERNAL REINFORCEMENT AND
METHOD OF PRODUCING THE HOLLOW SECTION

2 sheets of formal drawings in triplicate.

A check in the amount of \$345.00 covering the filing fee.

Claim for Priority. Certified copy of the corresponding foreign patent applications No. 198 12 288.8 filed March 20, 1998 and No. 198 56 255.1 filed December 7, 1998. PCT Publication (cover sheet only).

This application is being filed without a signed oath or declaration under the provisions of 37 CFR 1.53(d). Applicants await notification of the date by which the oath or declaration and the surcharge are due, pursuant to this rule.

The Patent and Trademark Office is hereby given authority to charge Deposit Account No. 12-1099 of Lerner and Greenberg, P.A. for any fees due or deficiencies of payments made for any purpose during the pendency of the above-identified application.

Respectfully submitted,

Werner H. Stemer
For Applicant

WERNER H. STEMER
REG. NO. 34,956

LAG:kc

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STATEMENT CLAIMING SMALL ENTITY STATUS
(37 CFR 1.9(f) & 1.27(b))--INDEPENDENT INVENTOR

Docket Number
2641/207-168

Applicant, Patentee, or Identifier: Friedhelm Beckmann

Filed or Issued: Concurrently herewith

Title: Hollow Section with Internal Reinforcement and Method for Producing the Hollow Section

As a below named inventor, I hereby state that I qualify as an independent inventor as defined in 37 CFR 1.9(c) for purposes of paying reduced fees to the Patent and Trademark Office described in:

- ☒ the specification filed herewith with title as listed above.
- ☐ the application identified above.
- ☐ the patent identified above.

I have not assigned, granted, conveyed, or licensed, and am under no obligation under contract or law to assign, grant, convey, or license, any rights in the invention to any person who would not qualify as an independent inventor under 37 CFR 1.9(c) if that person had made the invention, or to any concern which would not qualify as a small business concern under 37 CFR 1.9(d) or a nonprofit organization under 37 CFR 1.9(e).

Each person, concern, or organization to which I have assigned, granted, conveyed, or licensed or am under an obligation under contract or law to assign, grant, convey, or license any rights in the invention is listed below:

- ☐ No such person, concern, or organization exists.
- ☒ Each such person, concern, or organization is listed below.

Möller Plast GmbH

Kupferhammer, D-33649 Bielefeld, Germany

Separate statements are required from each named person, concern, or organization having rights to the invention stating their status as small entities. (37 CFR 1.27) I acknowledge the duty to file, in this application or patent, notification of any change in status resulting in loss of entitlement to small entity status prior to paying, or at the time of paying, the earliest of the issue fee or any maintenance fee due after the date on which status as a small entity is no longer appropriate. (37 CFR 1.28(b)).

Friedhelm Beckmann

Date

Applicants: FRIEDHELM BECKMANN

Filed : Concurrently herewith

Title : Hollow Section with Internal Reinforcement and Method for Producing
the Hollow Section

**VERIFIED STATEMENT (DECLARATION) CLAIMING SMALL ENTITY
STATUS (37 CFR 1.9(f) and 1.27(c)) - SMALL BUSINESS CONCERN**

I hereby declare that I am

- ☐ the owner of the small business concern identified below;
- ☐ an official of the small business concern empowered to act
on behalf of the concern identified below:

Name of Small Business Concern Möller Plast GmbH
Address of Concern Kupferhammer, 33649 Bielefeld, Germany

I hereby declare that the above identified small business concern qualifies as a small business concern as defined in 13 CFR 121.12, and reproduced in 37 CFR 1.9(d), for purposes of paying reduced fees to the United States Patent and Trademark Office, in that the number of employees of the concern, including those of its affiliates, does not exceed 500 persons. For purposes of this statement, (1) the number of employees of the business concern is the average over the previous fiscal year of the concern of the persons employed on a full-time, part-time or temporary basis during each of the pay periods of the fiscal year, and (2) concerns are affiliates of each other when either, directly or indirectly, one concern controls or has the power to control the other, or a third-party or parties controls or has the power to control both.

I hereby declare that rights under contract or law have been conveyed, to and remain with the small business concern identified above with regard to the invention, entitled HOLLOW SECTION WITH INTERNAL REINFORCEMENT AND METHOD FOR PRODUCING THE HOLLOW SECTION by inventor FRIEDHELM BECKMANN, described in the specification filed herewith.

I acknowledge the duty to file, in this application or patent, notification of any change in status resulting in loss of entitlement to small entity status prior to paying, or at the time of paying, the earliest of the issue fee or any maintenance fee due after the date on which status as a small entity is no longer appropriate. (37 CFR 1.28(b)).

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under section 1001 of Title 18 of the United States Code, and that such willful false

[illegible]

TITLE OF PERSON OTHER THAN OWNER: _____

ADDRESS OF PERSON SIGNING: _____

SIGNATURE: _____

DATE: _____

HOLLOW SECTION WITH INTERNAL REINFORCEMENT
AND METHOD OF PRODUCING THE HOLLOW SECTION

5

Cross-Reference to Related Application:

This is a continuation of copending International Application PCT/DE99/00700, filed March 15, 1999, which designated the United States.

Background of the Invention:

Field of the Invention:

The invention relates to a hollow section with internal reinforcement, especially for use in car bodies, as well as a method of producing the hollow section.

In mechanical engineering, and also especially in car manufacture, punched and preshaped plate sections are welded together to form a double shell. Adequate resistance torques and bending strengths of the hollow sections thus resulting can be achieved only if the plate cross sections are enlarged accordingly or the plate wall thickness is increased. An enlargement of the cross sections results, especially in motor vehicles, in a change in the internal or external dimensions, and an increase in the wall thickness results in an undesirable additional weight. Another possibility for

reinforcing hollow sections is to strengthen them with ribbed sections. In the case of hollow sections which are to be given an internal corrosion protection, ribbed sections are, however, unsuitable if a desired protective layer, as is customary with car bodies, is produced by the dipping method, because the ribbed sections prevent the corrosion protection agent from reaching all parts of the internal sections or form undesirable pockets.

German published patent application DE 42 27 393 A1 purports to have achieved a reduction in the corrosion susceptibility of the metal of the hollow body in the region of the space enclosed thereby. To this end, inter alia, an electrically conductive layer made from a sacrificial metal or from a foil is inserted, this layer being caused to lie against the inner surface of the hollow body by foaming a material encasing the core. This publication provides no indication of how an internal reinforcement suitable for absorbing forces can be achieved in the case of hollow sections.

The foam-filling of hollow parts to improve mechanical resistance to deformation is known from German published patent application DE 196 35 734 A1. The hollow parts concerned are primarily seamless or welded pipes, which can be reshaped if desired. No special measures for reducing susceptibility to corrosion are indicated.

Summary of the Invention:

The object of the invention is to provide a hollow section and a corresponding production method which overcomes the above-
5 noted deficiencies and disadvantages of the prior art devices and methods of this kind, and wherein a corrosion protection medium can reach all areas of the hollow section and a high degree of rigidity can be achieved without a substantial increase in weight or enlargement of the cross section.

10 With the above and other objects in view there is provided, in accordance with the invention, a method of producing a hollow section with internal reinforcement, which comprises:

coating a solid core material with activatable material;

15 enclosing the solid core material and the activatable material with an outer plate to form an assembly with a defined cavity inside the outer plate;

passing the assembly to a corrosion treatment bath and

20 subjecting all interior areas of the assembly to a corrosion protection agent; and

subsequently passing the assembly to a drying oven for initiating foaming of the activatable material and filling the cavity defined cavity with the activatable material.

In other words, the objects of the invention are satisfied with a hollow section having internal reinforcement, especially for use in car bodies, in which a core material is coated with activatable material and an outer plate is disposed to form a cavity, the size of the cavity being such that it can be completely filled by the operation of foaming the activatable material, and the solid core material being formed from a foamed or unfoamed metallic material or from a synthetic material reinforced with metal fibers, carbon fibers or glass fibers. The possibility exists of forming the solid core material with a flexurally rigid hollow section. Advantageously, the solid core material is coated with the activatable material only in some areas.

According to the invention, the core material and the outer material used for coating are formed from a reinforcing and/or an energy-absorbing foam system and/or an acoustic foam. In an embodiment of the invention, the core material is formed from an energy-absorbing material and the outer material used for coating is formed from a reinforcing material and/or an acoustic foam. In an alternative embodiment of the invention, the core material is formed from a reinforcing material and the outer material used for coating is formed from an energy-absorbing material and/or an acoustic foam. The possibility exists of forming the core material from an acoustic foam and

the outer material used for coating from a reinforcing and/or energy-absorbing material.

A method according to the invention is wherein the hollow
5 section, before the operation of foaming the activatable material, is passed to a corrosion protection dipping bath and the corrosion protection agent reaches all areas of the inner section and the hollow section is then passed to a drying oven.

10 With the above and other objects in view there is also provided, in accordance with the invention, a hollow section, comprising:

15 a solid core material formed of a material selected from the group consisting of foamed metallic material, unfoamed metallic material, synthetic material reinforced with fibers selected from the group consisting of metal fibers, carbon fibers, and glass fibers, and a hollow section;

activated, foamed material on the solid core material;

20 an outer plate enclosing the solid core material, with the foamed material at least partly filling a defined cavity between the solid core material and the outer plate;

the solid cover material, the foamed material, and the outer plate being corrosion treated with a corrosion protection agent and subsequent drying.

5 In accordance with a concomitant feature of the invention, temperature for the coating of the solid core material provided with the activatable material is kept lower than the stoving temperature for the anticorrosion layer in the drying oven. In a further embodiment of the invention, a reaction of the activatable material is deliberately initiated in the drying oven as a result of the higher temperature and the cavity originally deliberately formed between the activatable material and the outer plate is filled by the foam which forms.

10
15 Other features which are considered as characteristic for the invention are set forth in the appended claims.

Although the invention is illustrated and described herein as embodied in a hollow section with internal reinforcement and method for producing this hollow section, it is nevertheless not intended to be limited to the details shown, since various modifications and structural changes may be made therein without departing from the spirit of the invention and within
25 the scope and range of equivalents of the claims.

The construction and method of operation of the invention, however, together with additional objects and advantages thereof will be best understood from the following description of specific embodiments when read in connection with the accompanying drawings.

Brief Description of the Drawings:

Fig. 1 is a diagrammatic sectional view of a hollow section before foam-filling;

Fig. 2 is a similar view of the structure after foam-filling;

Fig. 3 is a diagrammatic section view of the structure similar to that of Fig. 1, but here with a solid core material in the form of a solid shaped body with a cavity; and

Fig. 4A to 4D are various sectional and partly perspective views of various alternative embodiments of sections coated with foamable material.

Description of the Preferred Embodiments:

Referring now to the figures of the drawing in detail and first, particularly, to Fig. 1 thereof, there is seen a solid core material 1 coated with an activatable material 2. An outer plate 4 is disposed to form a cavity 3. The cavity 3 is completely filled by the operation of foaming the activatable

material 2. The size of the cavity 3 is predetermined in accordance with the particular application. For this purpose, spacers 5 are used and, according to Figure 1, are disposed on the inside of the outer plate 4. According to Figure 3, the solid core material 1 is formed by a flexurally rigid hollow section 6.

Before the foaming operation, the hollow section 6 is passed to a corrosion protection dipping bath. Because the inside of the outer plate 4 is still freely accessible in this condition, the corrosion protection agent can reach all areas of the inner section. The coating of the core material 1 takes place at a temperature which is lower than the stoving temperature for the anticorrosion layer applied in the drying oven. This higher temperature in the drying oven results in a reaction of the coating material, as a result of which the foaming operation is initiated and the cavity 3 which has been deliberately formed is filled with foam.

I claim:

1. A method of producing a hollow section with internal reinforcement, which comprises:

coating a solid core material with activatable material;

enclosing the solid core material and the activatable material with an outer plate to form an assembly with a defined cavity inside said outer plate;

passing the assembly to a corrosion treatment bath and
subjecting all interior areas of the assembly to a corrosion protection agent; and

subsequently passing the assembly to a drying oven for initiating foaming of the activatable material and filling the cavity defined cavity with the activatable material.
2. The method according to claim 1, wherein the cavity is defined between the outer plate and the activatable material.
3. The method according to claim 1, wherein the cavity is completely filled by foaming the activatable material
4. The method according to claim 1, wherein the solid core material is formed of a foamed metallic material.

5. The method according to claim 1, wherein the solid core material is formed of an unfoamed metallic material.
6. The method according to claim 1, wherein the solid core material is formed of a synthetic material reinforced with fibers selected from the group consisting of metal fibers, carbon fibers, and glass fibers.
7. The method according to claim 1, wherein the solid core material is formed of a hollow section.
8. The method according to claim 1, which comprises maintaining a temperature for coating the solid core material lower than a stoving temperature for an anticorrosion layer in the drying oven.
9. The method according to claim 1, which comprises forming the cavity between the activatable material and the outer plate with spacers formed on the activatable material.
10. The method according to claim 1, wherein the coating step comprises coating the solid core material with the activatable material only in some areas.
11. The method according to claim 1, which comprises selecting the core material and the outer material from the

group of materials consisting of reinforcing foam, energy-absorbing foam system, and an acoustic foam.

12. The method according to claim 11, which comprises forming the core material from an energy-absorbing material and selecting an outer material used for coating from the group of materials consisting of a reinforcing material and an acoustic foam.

13. The method according to claim 11, which comprises forming the core material from a reinforcing material and selecting an outer material used for coating from the group consisting of an energy-absorbing material and an acoustic foam.

14. The method according to claim 11, which comprises forming the core material from an acoustic foam and selecting an outer material used for coating from the group consisting of a reinforcing material and an energy-absorbing material.

15. A hollow section, comprising:

a solid core material formed of a material selected from the group consisting of foamed metallic material, unfoamed metallic material, synthetic material reinforced with fibers selected from the group consisting of metal fibers, carbon fibers, and glass fibers, and a hollow section;

activated, foamed material on said solid core material;

an outer plate enclosing said solid core material, with said foamed material at least partly filling a defined cavity between said solid core material and said outer plate;

said solid cover material, said foamed material, and said outer plate being corrosion treated with a corrosion protection agent and subsequent drying.

16. The hollow section according to claim 15, wherein said cavity is completely filled by said foamed material

17. The hollow section according to claim 15, wherein said solid core material is coated with said foamed material only in some areas.

18. The hollow section according to claim 15, wherein said core material and an a coating outer material are formed of material selected from the group consisting of a reinforcing foam, an energy-absorbing foam system, and an acoustic foam.

Abstract of the Disclosure:

The hollow profiles with inner reinforcement are especially suited for use in automobile bodies. The aim of the invention is to ensure that an anti-corrosion medium reaches all areas and to obtain rigidity in a hollow structure without increasing the weight of the profile or enlarging its cross-section. To this end, a solid core material is coated with an activable material and an outer panel is arranged in such a way as to form a hollow space which can be filled through the foaming action of the activable material. The size of this hollow space is determined by how the spacers is determined by how the spacers are arranged, depending on the particular application. The solid core material consists of a foamed or non-foamed metallic material or of a synthetic material reinforced with metal fibers, carbon fibers or glass fibers.

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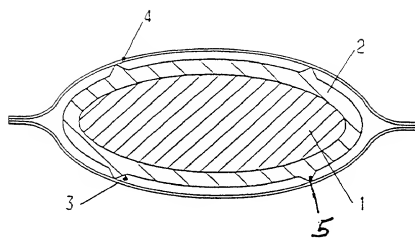


Fig. 1

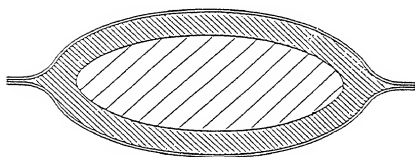


Fig. 2

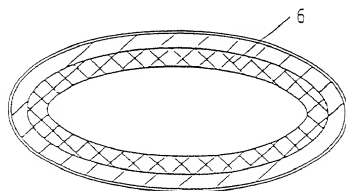


Fig. 3

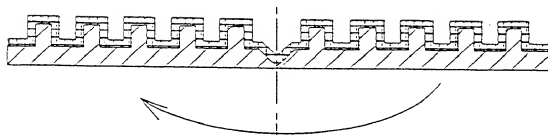


Fig. 4a

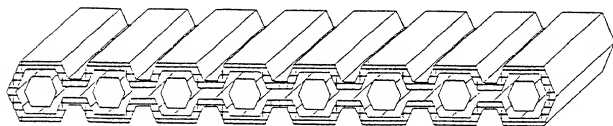


Fig. 4b

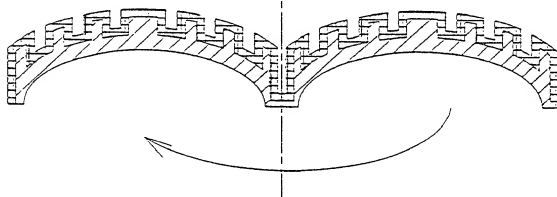


Fig. 4c

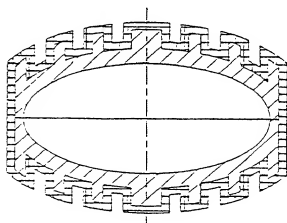


Fig. 4d

**COMBINED DECLARATION AND POWER OF ATTORNEY
IN ORIGINAL APPLICATION**

As a below named inventor, I hereby declare that: my residence, post office address and citizenship are as stated below next to my name; that I verily believe that I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled:

**HOLLOW SECTION WITH INTERNAL REINFORCEMENT AND
METHOD FOR PRODUCING THE HOLLOW SECTION**

described and claimed in the specification bearing that title, that I understand the content of the specification, that I do not know and do not believe the same was ever known or used in the United States of America before my or our invention thereof, or patented or described in any printed publication in any country before my or our invention thereof or more than one year prior to this application, that the same was not in public use or on sale in the United States of America more than one year prior to this application, that the invention has not been patented or made the subject of an inventor's certificate issued before the date of this application in any country foreign to the United States of America on an application filed by me or my legal representatives or assigns more than twelve month prior to this application, that I acknowledge my duty to disclose information of which I am aware which is material to the examination of this application under 37 C.F.R. 1.56a, and that no application for patent or inventor's certificate of this invention has been filed earlier than the following in any country foreign to the United States prior to this application by me or my legal representatives or assigns:

German Application Nos. 198 12 288.8, filed March 20, 1998 and 198 56 255.1, filed December 7, 1998, the International Priorities of which are claimed under 35 U.S.C. §119; and International Application No. PCT/DE99/00700, filed March 15, 1999, the Priority of which is claimed under 35 U.S.C. §120.

I hereby appoint the following attorney(s) and/or agent(s) to prosecute this application and to transact all business in the Patent and Trademark Office connected therewith:

HERBERT L. LERNER (Reg.No.20,435)
LAURENCE A. GREENBERG (Reg.No.29,308)
WERNER H. STEMER (Reg.No.34,956)
RALPH E. LOCHER (Reg.No.41,947)

Address all correspondence and telephone calls to:

LERNER AND GREENBERG, P.A.
POST OFFICE BOX 2480
HOLLYWOOD, FLORIDA 33022-2480
Tel: (954) 925-1100 - Fax: (954) 925-1101

I hereby state that I have reviewed and understand the contents of the above-identified specification, including the claims, as amended by any amendment referred to above.

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

FULL NAME OF SOLE INVENTOR:

FRIEDHELM BECKMANN

INVENTOR'S SIGNATURE: _____

DATE: _____

Residence: HIDDENHAUSEN, GERMANY

Country of Citizenship: GERMANY

Post Office Address: KASTANIENSTRASSE 16
D-32120 HIDDENHAUSEN
GERMANY
